







GTAGAAACTGTGCACAAGGACAATATCTGTCATATTGTGTATGCTCCGGCCAGAGTTAATGACACCATCCAAAAG
 CATCTTTGACACGTGTTCTCTGTTATAGACAGTATAACACATACGAGGCCGGTCTCAATTACTGTGGTAGGTTTTTC

3150

V E T V H K D N I C H I V Y A P A R V N D T I Q K
 PpADE2

BbsI

AAAGCTCAATATTAGCTGAAAACACTGTGAAGACTTTCCAGGCGCTGGAATCTTCGGAGTTGAGATGTTTCTA
 TTTTCGAGTTTATAATCGACTTTTGTGACACTTCTGAAAGGGTCCGCGACCTTAGAAGCCTCAACTCTACAAGGAT

3225

K A Q I L A E N T V K T F P G A G I F G V E M F L
 PpADE2

TTGTCTGATGGAGAACTTCTTGAAATGAGATTGCTCCAAGGCCCCACAATTCTGGTCACTATACAATCGATGCA
 AACAGACTACCTCTTGAAGAACATTTACTCTAACGAGGTTCCGGGGTGTAAAGACCAGTGATATGTTAGCTACGT

3300

L S D G E L L V N E I A P R P H N S G H Y T I D A
 PpADE2

TGTGTAACATCTCAGTTTGAAGCACATGTAAGAGCCATAACTGGTCTGCCAATGCCACTAGATTTACCAAACCTA
 ACACATTGTAGAGTCAAGCTTCGTGTACATTCTCGGTATTGACCAGACGGTTACGGTGATCTAAAGTGGTTTTGAT

3375

C V T S Q F E A H V R A I T G L P M P L D F T K L
 PpADE2

TCTACTTCCAACACCAACGCTATTATGCTCAATGTTTTGGGTGCTGAAAAATCTCACGGGGAATTAGAGTTTTGT
 AGATGAAGGTTGTGGTTGCGATAATACGAGTTACAAAACCCACGACTTTTTAGAGTGCCCTTAATCTCAAAAACA

3450

S T S N T N A I M L N V L G A E K S H G E L E F C
 PpADE2

DraIII

AGAAGAGCCTTAGAAACACCCGGTCTTCTGTATATCTGTACGGAAAGACCACCCGATTGGCTCGTAAGATGGGT
 TCTTCTCGGAATCTTTGTGGGCCACGAAGACATATAGACATGCCTTTCTGGTGGGCTAACCGAGCATTCTACCCA

3525

R R A L E T P G A S V Y L Y G K T T R L A R K M G
 PpADE2

CATATCAACATAATAGGATCTTCCATGTTGGAAGCAGAACAAAAGTTAGAGTACATTCTAGAAGAATCAACCCAC
 GTATAGTTGTATTATCCTAGAAGGTACAACCTTCGTCTTGTTTTCAATCTCATGTAAGATCTTCTTAGTTGGGTG

3600

H I N I I G S S M L E A E Q K L E Y I L E E S T H
 PpADE2

TTACCATCCAGTACTGTATCAGCTGACACTAAACCGTTGGTTGGAGTTATCATGGGTTTCAGACTCTGATCTACCT
 AATGGTAGGTCATGACATAGTCGACTGTGATTTGGCAACCAACCTCAATAGTACCCAAGTCTGAGACTAGATGGA

3675

L P S S T V S A D T K P L V G V I M G S D S D L P
 PpADE2

GTGATTTTCAAAGGTTGCGATATTTTAAAACAGTTTGGTGTTCATTTCGAAGTTACTATTGTCTCTGCTCATAGA
 CACTAAAGCTTTCCAACGCTATAAAATTTTGTCAAACCACAAGGTAAGCTTCAATGATAACAGAGACGAGTATCT

3750

V I S K G C D I L K Q F G V P F E V T I V S A H R
 PpADE2

ACACCACAGAGAATGACCAGATATGCCTTTGAAGCCGCTAGTAGAGGTATCAAGGCTATCATTGCAGGTGCTGGT
 TGTGGTGTCTCTTACTGGTCTATACGGAAACTTCGGCGATCATCTCCATAGTTCCGATAGTAACGTCCACGACCA

3825

T P Q R M T R Y A F E A A S R G I K A I I A G A G
 PpADE2

GGTGCTGCTCATCTTCCAGGAATGGTTGCTGCCATGACTCCGTTGCCAGTCATTGGTGTTCCTGTCAAGGGCTCT
CCACGACGAGTAGAAGGTCCTTACCAACGACGGTACTGAGGCAACGGTCAGTAACCACAAGGACAGTTCCCGAGA

3900

G A A H L P G M V A A M T P L P V I G V P V K G S
PpADE2

ACGTTGGATGGTGTAGACTCGCTACACTCGATTGTCCAAATGCCTAGAGGTGTTCTGTGGCTACGGTTGCTATC
TGCAACCTACCACATCTGAGCGATGTGAGCTAACAGGTTTACGGATCTCCACAAGGACACCGATGCCAACGATAG

3975

T L D G V D S L H S I V Q M P R G V P V A T V A I
PpADE2

AACAACGCCACCAATGCCGCTCTGTTGGCCATCAGGATTTTAGGTACAATTGACCACAAATGGCAAAGGAAATG
TTGTTGCGGTGGTTACGGCGAGACAACCGGTAGTCTTAAATCCATGTTAACTGGTGTTTACCGTTTTCTTTAC

4050

N N A T N A A L L A I R I L G T I D H K W Q K E M
PpADE2

TCCAAGTATATGAATGCAATGGAGACCGAAGTGTGGGGAAGGCATCCAACCTGGAATCTGAAGGGTATGAATCC
AGGTTTCATATACTTACGTTACCTCTGGCTTCACAACCCCTTCCGTAGGTTGAACCTTAGACTTCCATACTTAGG

4125

S K Y M N A M E T E V L G K A S N L E S E G Y E S
PpADE2

BsaAI

TATTTGAAGAATCGTCTTTGAATTTAGTATTGTTTTTAAATAGATGTATATATAATAGTACACGTAACCTTATCTA
ATAAACTTCTTAGCAGAAACTTAAATCATAACAAAAAATTATCTACATATATATTATCATGTGCATTGAATAGAT

4200

Y L K N R L
PpADE2

TTCCATTATAATTTTATTTTAAAGGTTCCGGTAGAAATTTGTCTCCAAAAAGTTGGTTAGAGCCTGGCAGTTTT
AAGGTAAGTATTAATAAAATTTCCAAGCCATCTTTAAACAGGAGGTTTTTCAACCAATCTCGGACCGTCAAAA

4275

BsgI

AscI
BssHII

GATAGGCATTATTATAGATTGGGTAATATTTACCCTGCACCTGGAGGAACCTTTGCAAAGAGCCTCATGTGCGGGC
CTATCCGTAATAATATCTAACCCATTATAAATGGGACGTGGACCTCCTTGAAACGTTTCTCGGAGTACACGCCGC

4350

CGCCAGGCCATAATGGCCAAACGGTTTCTCAATTACTATATACTACTAACCATTTACCTGTAGCGTATTTCTTTT
GCGGTCCGGTATTACCGGTTTGCCAAAGAGTTAATGATATATGATGATTGGTAAATGGACATCGCATAAAGAAAA

4425

PpTRP2 promoter

NruI

CCCTCTTCGCGAAAGCTCAAGGGCATCTTCTTGACTCATGAAAAATATCTGGATTTCTTCTGACAGATCATCACC
GGGAGAAGCGCTTTCGAGTTCCCGTAGAAGAACTGAGTACTTTTTATAGACCTAAAGAAGACTGTCTAGTAGTGG

4500

PpTRP2 promoter

BsaBI

CTTGAGCCCAACTCTCTAGCCTATGAGTGTAAGTGATAGTCATCTTGCAACAGATTATTTTGGAACGCAACTAAC
GAACTCGGGTTGAGAGATCGGATACTCACATTCATCAGTAGAACGTTGTCTAATAAAACCTTGC GTTGATTG

4575

M S V S D S H L A T D Y F G T Q L T
PpTRP2 promoter PpTRP2

AAAGCAGATACACCCTTCAGCAGAATCCTTTCTGGATATTGTGAAGAATGATCGCCAAAGTCACAGTCCTGAGAC
TTTCGTCTATGTGGGAAGTCGTCTTAGGAAAGACCTATAACACTTCTTACTAGCGTTTCAGTGTGTCAGGACTCTG

4650

K Q I H P S A E S F L D I V K N R Q S H S P E T
PpTRP2

AGTTCCTAATCTTTACCCCATTTACAAGTTCATCCAATCAGACTTCTTAACGCCTCATCTGGCTTATATCAAGCT
TCAAGGATTAGAAATGGGGTAAATGTTCAAGTAGGTTAGTCTGAAGAATTGCGGAGTAGACCGAATATAGTTCTGA

4725

V P N L Y P I Y K F I Q S D F L T P H L A Y I K L
PpTRP2

TACCAACAGTTCAGAACTCCCAGTCCAAGTTTCTTGCTTGAAAGTGCGAAGAATGGTGACACCGTTGACAGGTA
ATGGTTGTCAAGTCTTTGAGGGTCAGGTTCAAAGAACGAACCTTTCACGCTTCTTACCCTGTGGCAACTGTCCAT

4800

T N S S E T P S P S F L L E S A K N G D T V D R Y
PpTRP2

CACCTTTATGGGACATTCCTCCAGAAAAATAATCAAGACTGGGCCTTTAGAGGGTGTGAAGTTGACCCCTTGGT
GTGGAAATACCCTGTAAGGGGGTCTTTTTATTAGTTCTGACCCGAAATCTCCACGACTTCAACTGGGGAACCA

4875

T F M G H S P R K I I K T G P L E G A E V D P L V
PpTRP2

GCTTCTGGAAAAAGAACTGAAGGGCACCAAGCAACTTCTGGTATTCTCTCGTCTAAGTGGTGGTGCAT
CGAAGACCTTTTTCTTGACTTCCCGTGGTCTGTTTCGCGTTGAAGGACCATAAGGAGCAGATTACCACCACGGTA

4950

L L E K E L K G T R Q A Q L P G I P R L S G G A I
PpTRP2

AGGATACATCTCGTACGATTGTATTAAGTACTTTGAACCAAAAAGTAAAGAAAAGTAAAGATGTTTTGCAACT
TCCTATGTAGAGCATGCTAACATAATTCATGAACTTGGTTTTGACTTTCTTTTACTTTCTACAAAACGTTGA

5025

G Y I S Y D C I K Y F E P K T E R K L K D V L Q L
PpTRP2

BspEI

TCCGGAAGCAGCTTTGATGTTGTTTCGACACGATCGTGGCTTTTGACAATGTTTATCAAAGATTCCAGGTAATTGG
AGGCCTTCGTCGAAACTACAACAAGCTGTGCTAGCACCGAAAAGTGTACAAATAGTTTCTAAGGTCCATTAACC

5100

P E A A L M L F D T I V A F D N V Y Q R F Q V I G
PpTRP2

PsiI

AAACGTTTCTCTATCCGTTGATGACTCGGACGAAGCTATTCTTGAGAAATATTATAAGACAAGAGAAGAAGTGG
TTTGCAAAGAGATAGGCAACTACTGAGCCTGCTTCGATAAGAACTCTTTATAATATTCTGTTCTCTTCTCACCT

5175

N V S L S V D D S D E A I L E K Y Y K T R E E V E
PpTRP2

AAAGATCAGTAAAGTGGTATTTGACAATAAAAAGTTCCTACTATGAACAGAAAGATATTATTCAAGGCCAAAC
TTTCTAGTCATTTACCATAAACTGTTATTTTGACAAGGGATGATACTTGTCTTTCTATAATAAGTTCCGGTTTG

5250

K I S K V V F D N K T V P Y Y E Q K D I I Q G Q T
PpTRP2

GTTACCTCTAATATTGGTCAGGAAGGGTATGAAAACCATGTTTCGCAAGCTGAAAGAACATATTCTGAAAGGAGA
CAAGTGGAGATTATAACCAGTCTTCCCATACTTTTGGTACAAGCGTTCGACTTCTTGTATAAGACTTTCCTCT

5325

F T S N I G Q E G Y E N H V R K L K E H I L K G D
PpTRP2

EcoNI

CATCTTCCAAGCTGTTCCCTCTCAAAGGGTAGCCAGGCCGACCTCATTGCACCCTTTCAACATCTATCGTCATTT
 GTAGAAGGTTTCGACAAGGGAGAGTTTCCCATCGGTCCGGCTGGAGTAACGTGGGAAAGTTGTAGATAGCAGTAAA

270 275 280 285 290
 I F Q A V P S Q R V A R P T S L H P F N I Y R H L

PpTRP2

5400

GAGAACTGTCAATCCTTCTCCATACATGTTCTATATTGACTATCTAGACTTCCAAGTTGTTGGTGCTTCACCTGA
 CTCTTGACAGTTAGGAAGAGGTATGTACAAGATATAACTGATAGATCTGAAGGTTCAACAACCACGAAGTGGACT

295 300 305 310 315
 R T V N P S P Y M F Y I D Y L D F Q V V G A S P E

PpTRP2

5475

SpeI

ATTACTAGTTAAATCCGACAACAACAACAAAATCATCACACATCCTATTGCTGGAACCTTTCCAGAGGTAAAAC
 TAATGATCAATTTAGGCTGTTGTTGTTGTTTGTAGTGTGTAGGATAACGACCTTGAGAAGGGTCTCCATTTTG

320 325 330 335 340
 L L V K S D N N N K I I T H P I A G T L P R G K T

PpTRP2

5550

BmgBI

TATCGAAGAGGACGACAATTATGCTAAGCAATTGAAGTCGTCTTTGAAAGACAGGGCCGAGCACGTCATGCTGGT
 ATAGCTTCTCCTGCTGTTAATACGATTCGTTAACTTCAGCAGAACTTTCTGTCCCGGCTCGTGCAGTACGACCA

345 350 355 360 365
 I E E D D N Y A K Q L K S S L K D R A E H V M L V

PpTRP2

5625

AGATTTGGCCAGAAATGATATTAACCGTGTGTGTGAGCCACCAGTACCACGGTTGATCGTTTATTGACTGTGGA
 TCTAAACCGGTCTTTACTATAATTGGCACACACACTCGGGTGGTCATGGTGCCAACCTAGCAAATAACTGACACCT

370 375 380 385 390
 D L A R N D I N R V C E P T S T T V D R L L T V E

PpTRP2

5700

GAGATTTTCTCATGTGATGCATCTTGTGTCAGAAGTCAGTGGAAACATTGAGACCAAACAAGACTCGCTTCGATGC
 CTCTAAAAGAGTACACTACGTAGAACACAGTCTTCAGTCACCTTGTAACTCTGGTTTGTCTGAGCGAAGCTACG

395 400 405 410 415
 R F S H V M H L V S E V S G T L R P N K T R F D A

PpTRP2

5775

TTTCAGATCCATTTTCCCAGCAGGAACCGTCTCCGGTGCTCCGAAGGTAAGAGCAATGCAACTCATAGGAGAATT
 AAAGTCTAGGTAAAAGGGTCGTCTTGGCAGAGGCCACGAGGCTTCCATTCTCGTTACGTTGAGTATCCTCTTAA

420 425 430 435 440
 F R S I F P A G T V S G A P K V R A M Q L I G E L

PpTRP2

5850

PshAI

GGAAGGAGAAAAGAGAGGTGTTTATGCGGGGGCCGTAGGACACTGGTTCGTACGATGGAAAATCGATGGACACATG
 CCTTCTCTTTTCTCTCCACAAATACGCCCCCGGCATCCTGTGACCAGCATGCTACCTTTTAGCTACCTGTGTAC

445 450 455 460 465
 E G E K R G V Y A G A V G H W S Y D G K S M D T C

PpTRP2

5925

AflII

TATTGCCTTAAGAACAATGGTCGTCAAGGACGGTGTGCTTACCTTCAAGCCGGAGGTGGAATTGTCTACGATTC
 ATAACGGAATTCTTGTACCAGCAGTTCTGCCACAGCGAATGGAAGTTCGGCCTCCACCTTAACAGATGCTAAG

470 475 480 485 490
 I A L R T M V V K D G V A Y L Q A G G G I V Y D S

PpTRP2

6000

TGACCCCTATGACGAGTACATCGAAACCATGAACAAAATGAGATCCAACAATAACACCATCTTGGAGGCTGAGAA
ACTGGGGATACTGCTCATGTAGCTTTGGTACTTGTTTTACTCTAGGTTGTTATTGTGGTAGAACCCTCCGACTCTT

6075

D P Y D E Y I E T M N K M R S N N T I L E A E K

PpTRP2

AATCTGGACCGATAGGTTGGCCAGAGACGAGAATCAAAGTGAATCCGAAGAAAACGATCAATGAACGGAGGACGT
TTAGACCTGGCTATCCAACCGGTCTCTGCTCTTAGTTTCACTTAGGCTTCTTTTGCTAGTTACTTGCCTCCTGCA

6150

I W T D R L A R D E N Q S E S E E N D Q

PpTRP2

AAGTAGGAATTTATGGTTTGGCCATAATGGCCTAGCTTGGCGTAATCATGGTCATAGCTGTTTCCTGTGTGAAAT
TTCATCCTTAAATACCAAACCGGTATTACCGGATCGAACCGCATTAGTACCAGTATCGACAAAGGACACACTTTA

6225

TGTTATCCGCTCACAATTCCACACAACATACGAGCCGGAAGCATAAAGTGTAAAGCCTGGGGTGCCTAATGAGTG
ACAATAGGCGAGTGTTAAGGTGTGTTGTATGCTCGGCCTTCGTATTTACATTTTCGGACCCACGGATTACTCAC

6300

AGCTAACTCACATTAATTGCGTTGCGCTCACTGCCCGCTTTCAGTCGGGAAACCTGTCGTGCCAGCTGCATTA
TCGATTGAGTGTAATTAACGCAACGCGAGTGACGGGCGAAAGGTCAGCCCTTTGGACAGCACGGTCGACGTAATT

6375

TGAATCGGCCAACGCGCGGGGAGAGGCGGTTTGCGTATTGGGCGCTCTTCCGCTTCTCGCTCACTGACTCGCTG
ACTTAGCCGGTTGCGCGCCCTCTCCGCCAAACGCATAACCCGCGAGAAGGCGAAGGAGCGAGTGACTGAGCGAC

6450

CGCTCGGTCGTTCCGGCTGCGGCGAGCGGTATCAGCTCACTCAAAGGCGGTAATACGGTTATCCACAGAATCAGGG
GCGAGCCAGCAAGCCGACGCCGCTCGCCATAGTCGAGTGAGTTTCCGCCATTATGCCAATAGGTGTCTTAGTCCC

6525

GATAACGCAGGAAAGAACATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAACCGTAAAAAGGCCGCGTTGCTGGCG
CTATTGCGTCCTTTCTTGTACACTCGTTTTCCGGTCGTTTTCCGGTCCTTGGCATTTTTCCGGCGCAACGACCGC

6600

TTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGACA
AAAAAGGTATCCGAGGCGGGGGACTGCTCGTAGTGTTTTTAGCTGCGAGTTCAGTCTCCACCGCTTTGGGCTGT

6675

ori

GGACTATAAAGATACCAGGCGTTTTCCCCCTGGAAGCTCCCTCGTGCGCTCTCCTGTTCCGACCCCTGCCGCTTACC
CCTGATATTTCTATGGTCCGCAAAGGGGGACCTTCGAGGGAGCACGCGAGAGGACAAGGCTGGGACGGCGAATGG

6750

ori

GGATACCTGTCCGCTTTTCTCCCTTCGGGAAGCGTGGCGCTTTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCCG
CCTATGGACAGGCGGAAAGAGGGAAAGCCCTTCGCACC GCGAAAGAGTATCGAGTGCGACATCCATAGAGTCAAGC

6825

ori

GTGTAGGTCGTTCCGCTCCAAGCTGGGCTGTGTGCACGAACCCCGTTTCAGCCCGACCGCTGCGCCTTATCCGGT
CACATCCAGCAAGCGAGGTTTCGACCCGACACACGTGCTTGGGGGGCAAGTCGGGCTGGCGACGCGGAATAGGCCA

6900

ori

AACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGC
TTGATAGCAGAACTCAGGTTGGGCCATTCTGTGCTGAATAGCGGTGACCGTCTGTCGGTGACCATTGTCCTAATCG

6975

ori

AGAGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGGCCTAACTACGGCTACACTAGAAGGACAGTA
TCTCGCTCCATACATCCGCCACGATGTCTCAAGAACTTACCACCGGATTGATGCCGATGTGATCTTCTGTGCTAT

7050

ori

TTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAACAACC
 AAACCATAGACGCGAGACGACTTCGGTCAATGGAAGCCTTTTTCTCAACCATCGAGAAGTAGGCCGTTTGTGG

7125

ori

ACCGCTGGTAGCGGTGGTTTTTTTTGTTTGAAGCAGCAGATTACGCGCAGAAAAAAGGATCTCAAGAAGATCCT
 TGGCGACCATCGCCACCAAAAAACAAACGTTCTGCTCTAATGCGCGTCTTTTTTCTAGAGTTCTTCTAGGA

7200

ori

TTGATCTTTTCTACGGGGTCTGACGCTCAGTGAACGAAAACCTCACGTTAAGGGATTTTGGTCATGAGATTATCA
 AACTAGAAAAGATGCCCCAGACTGCGAGTCACCTTGCTTTTGAGTGCAATTCCTAAAACCAGTACTCTAATAGT

7275

AAAAGGATCTTCACCTAGATCCTTTTAAATTAATAATGAAGTTTTAAATCAATCTAAAGTATATATGAGTAACT
 TTTTCTAGAAGTGGATCTAGGAAAATTTAATTTTTACTTCAAATTTAGTTAGATTTTCATATATACTCATTTGA

7350

TGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTTTCGTTTCATCCATAGTT
 ACCAGACTGTCAATGGTTACGAATTAGTCACTCCGTGGATAGAGTCGCTAGACAGATAAAGCAAGTAGGTATCAA

7425

285 280 275 270
 * W H K I L S A G I E A Q R N R E D M T
 AmpR

GCCTGACTCCCCGTCGTGTAGATAACTACGATACGGGAGGGCTTACCATCTGGCCCCAGTGCTGCAATGATACCG
 CGGACTGAGGGGCAGCACATCTATTGATGCTATGCCCTCCCGAATGGTAGACCGGGGTCACGACGTTACTATGGC

7500

265 260 255 250 245
 A Q S G T T Y I V V I R S P K G D P G L A A I I G
 AmpR

CGAGACCCACGCTCACCGGCTCCAGATTTATCAGCAATAAACCAGCCAGCCGGAAGGGCCGAGCGCAGAAGTGGT
 GCTCTGGGTGCGAGTGGCCGAGGTCTAAATAGTCGTTATTTGGTTCGGCTCGGCCTTCCCGGCTCGCGTCTTCACCA

7575

240 235 230 225 220
 R S G R E G A G S K D A I F W G A P L A S R L L P
 AmpR

CCTGCAACTTTATCCGCCTCCATCCAGTCTATTAATTGTTGCCGGGAAGCTAGAGTAAGTAGTTTCGCCAGTTAAT
 GGACGTTGAAATAGGCGGAGGTAGGTCAGATAATTAACAACGGCCCTTCGATCTCATTTCATCAAGCGGTCAATTA

7650

215 210 205 200 195
 G A V K D A E M W D I L Q Q R S A L T L L E G T L
 AmpR

AGTTTGCGCAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTACGCTCGTCTGTTTGGTATGGCTTCATTACGC
 TCAAACGCGTTGCAACAACGGTAACGATGTCCGTAGCACCACAGTGCAGCAGCAAACCATAACCGAAGTAAGTCG

7725

190 185 180 175 170
 L K R L T T A M A V P M T T D R E D N P I A E N L
 AmpR

TCCGTTCCCAACGATCAAGGCGAGTTACATGATCCCCATGTTGTGCAAAAAAGCGTTAGCTCCTTCGGTCTCT
 AGGCCAAGGGTTGCTAGTTCGCTCAATGTACTAGGGGGTACAACACGTTTTTTTCGCCAATCGAGGAAGCCAGGA

7800

165 160 155 150 145
 E P E W R D L R T V H D G M N H L F A T L E K P G
 AmpR

CCGATCGTTGTCAGAAGTAAGTTGGCCGCGAGTGTATCACTCATGGTTATGGCAGCACTGCATAATTCTTCTACT
 GGCTAGCAACAGTCTTCATTCAACCGGCGTCACAATAGTGAGTACCAATACCGTCGTGACGTATTAAGAGAATGA

7875

140 135 130 125 120
 G I T T L L L N A A T N D S M T I A A S C L E R V
 AmpR

GTCATGCCATCCGTAAGATGCTTTTCTGTGACTGGTGGAGTACTCAACCAAGTCATTCTGAGAATAGTGTATGCGG
CAGTACGGTAGGCATTCTACGAAAAGACACTGACCACTCATGAGTTGGTTTCAGTAAGACTCTTATCACATACGCC

7950

T M G D T L H K E T V P S Y E V L D N Q S Y H I R

AmpR

CGACCGAGTTGCTCTTGCCCGGCGTCAATACGGGATAATACCGCGCCACATAGCAGAACTTTAAAAGTGCTCATC
GCTGGCTCAACGAGAACGGGCCGAGTTATGCCCTATTATGGCGCGGTGTATCGTCTTGAAATTTTCACGAGTAG

8025

R G L Q E Q G A D I R S L V A G C L L V K F T S M

AmpR

ATTGGAAAACGTTCTTCGGGGCGAAAACCTCTCAAGGATCTTACCGCTGTTGAGATCCAGTTCGATGTAACCCACT
TAACCTTTTGCAAGAAGCCCCGCTTTTGAGAGTTCCTAGAATGGCGACAACCTCTAGGTCAAGCTACATTGGGTGA

8100

M P F R E E P R F S E L I K G S N L D L E I Y G V

AmpR

CGTGCACCCAACCTGATCTTCAGCATCTTTTACTTTTACCAGCGTTTCTGGGTGAGCAAAAACAGGAAGGCAAAAT
GCACGTGGGTGACTAGAAGTCGTAGAAAATGAAAGTGGTCGCAAAGACCCACTCGTTTTTGTCTTCCGTTTTTA

8175

R A G L Q D E A D K V K V L T E P H A F V P L C F

signal sequence

AmpR

GCCGCAAAAAGGGAATAAGGGCGACACGGAAATGTTGAATACTCATACTCTTCCTTTTTCAATATTATTGAAGC
CGGCGTTTTTCCCTTATTCCCGCTGTGCCTTTACAACCTTATGAGTATGAGAAGGAAAAGTTATAATAACTTCCG

8250

A A F F P I L A V R F H Q I S M

signal sequence

AmpR promoter

AmpR

ATTTATCAGGGTTATTGTCTCATGAGCGGATACATATTTGAATGATTTAGAAAAATAAACAAATAGGGGTTCCG
TAAATAGTCCCAATAACAGAGTACTCGCCTATGTATAAACCCTACATAAATCTTTTTATTTGTTTATCCCAAGGC

8325

AmpR promoter

ZraI AatII

CGCACATTTCCCGAAAAGTGCCACCTGACGTCTAAGAAACCATTATTATCATGACATTAACCTATAAAAATAGG
GCGTGTAAGGGGCTTTTACGCGTGGACTGCAGATTCTTTGGTAATAATAGTACTGTAATTGGATATTTTTATCC

8400

AmpR promoter

CGTATCACGAGGCCCTTTCGTCTCGCGGTTTCGGTGATGACGGTGAAAACCTCTGACACATGCAGCTCCCGGAG
GCATAGTGCTCCGGGAAAGCAGAGCGCGCAAAGCCACTACTGCCACTTTTGGAGACTGTGTACGTGAGGGCCTC

8475

ACGGTCACAGCTTGTCTGTAAGCGGATGCCGGGAGCAGACAAGCCCCTCAGGGCGCGTCAGCGGGTGTGGCGGG
TGCCAGTGTCGAACAGACATTCGCCTACGGCCCTCGTCTGTTTCGGGCAGTCCCGCGCAGTCGCCACAACCGCCC

8550

NdeI

TGTCGGGGCTGGCTTAACTATGCGGCATCAGAGCAGATTGTAAGTACTGAGAGTGCACCATATGCGGTGTGAAATACCG
ACAGCCCCGACCGAATTGATACGCCGTAGTCTCGTCTAACATGACTCTCACGTGGTATACGCCACACTTTATGGC

8625

KasI NarI SfoI PfuTI

CACAGATGCGTAAGGAGAAAATACCGCATCAGGCGCCATTTCGCCATTACAGGCTGCGCAACTGTTGGGAAGGGCGA
GTGTCTACGCATTCTTTTATGGCGTAGTCCGCGGTAAGCGGTAAGTCCGACGCGTTGACAACCTTCCCGCT

8700

TCGGTGCGGGCCTCTTCGCTATTACGCCAGCTGGCGAAAGGGGGATGTGCTGCAAGGCGATTAAGTTGGGTAACG
AGCCACGCCC GGAGAAGCGATAATGCGGTGACCGCTTTCCCCCTACACGACGTTCCGCTAATTCAACCCATTGC

CCAGGGTTTTCCAGTCACGACGTTGTAAAACGACGGCCAGTGAATTG 3 '
GGTCCCAAAGGGTCAGTGCTGCAACATTTTGCTGCCGGTCACTTAAC 5 ' 8823